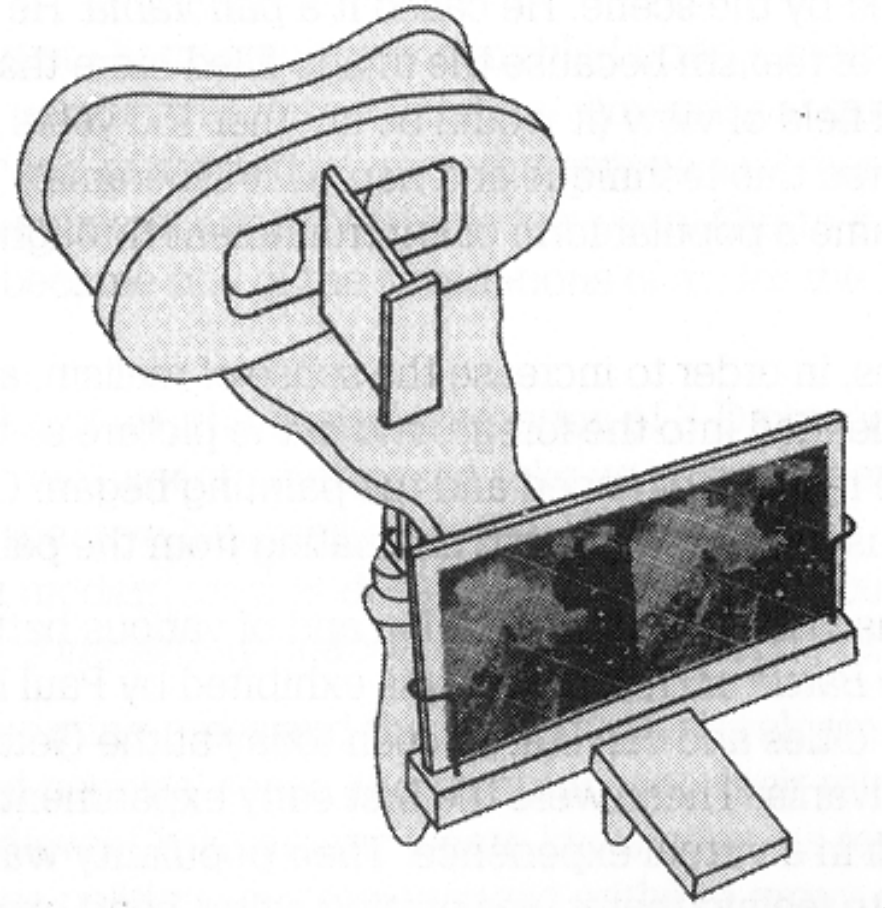
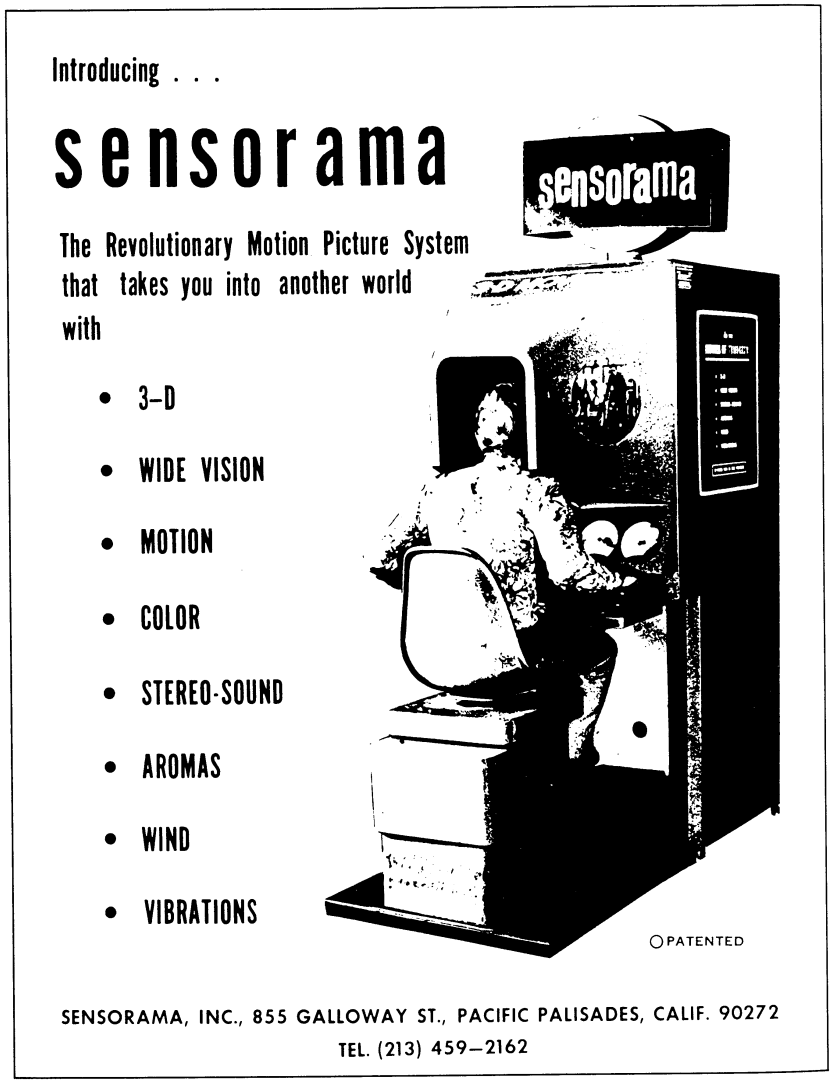
Overview

- **Sensorama**
- **Ivan Sutherland**
- **University of North Carolina at Chapel Hill**
- **MIT**
- **NASA Ames Research Center**
- **VPL**
- **Others...**

Stereo Imagery



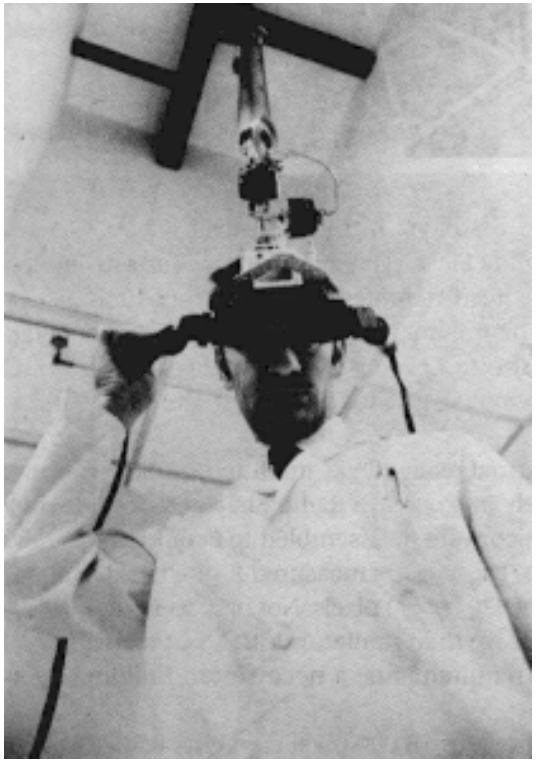
Sensorama



- **An early attempt to build a full sensory experience**

Ivan Sutherland

The First Head-Mounted Display

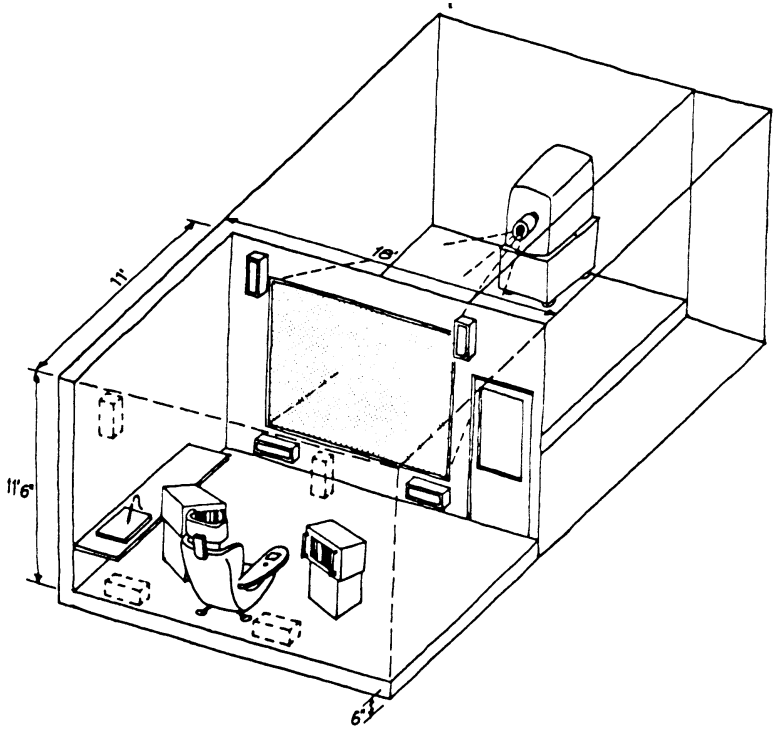


- **Developed at Harvard in the 1960's**
- **Consisted of 2 miniature CRT's mounted at the side of the user's head plus an optics system.**

Ivan Sutherland

MIT “Put That There” (1983)

- **A voice recognition, and hand gesture-based (with Polhemus) large screen command room.**



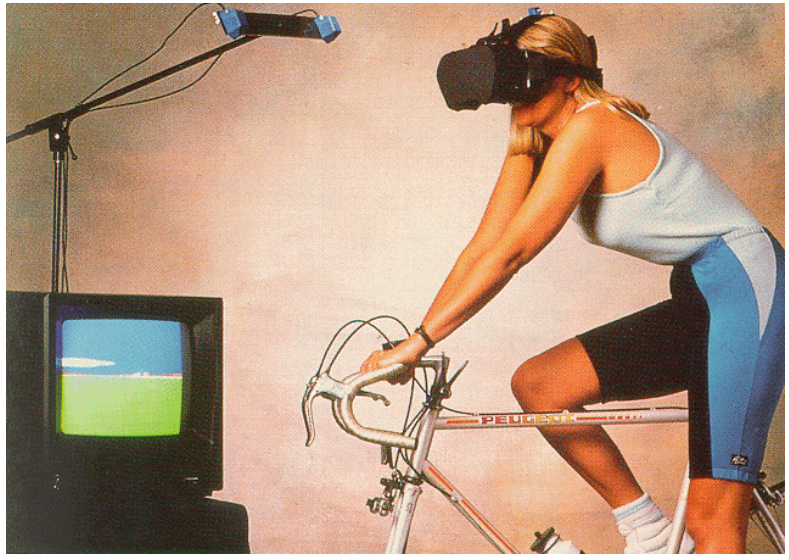
video

MIT “The Aspen Movie Map” (1983)

- **A videodisk of the town of Aspen, Colorado was constructed**
- **The videodisk allowed the user to walk around the town and make decisions at intersections as to which way to go. Some buildings could be entered.**

University of North Carolina at Chapel Hill

- **Walkthrough**
- **Pixelplanes**
- **Force Feedback, Nanomanipulator**
- **Optical ceiling tracker**



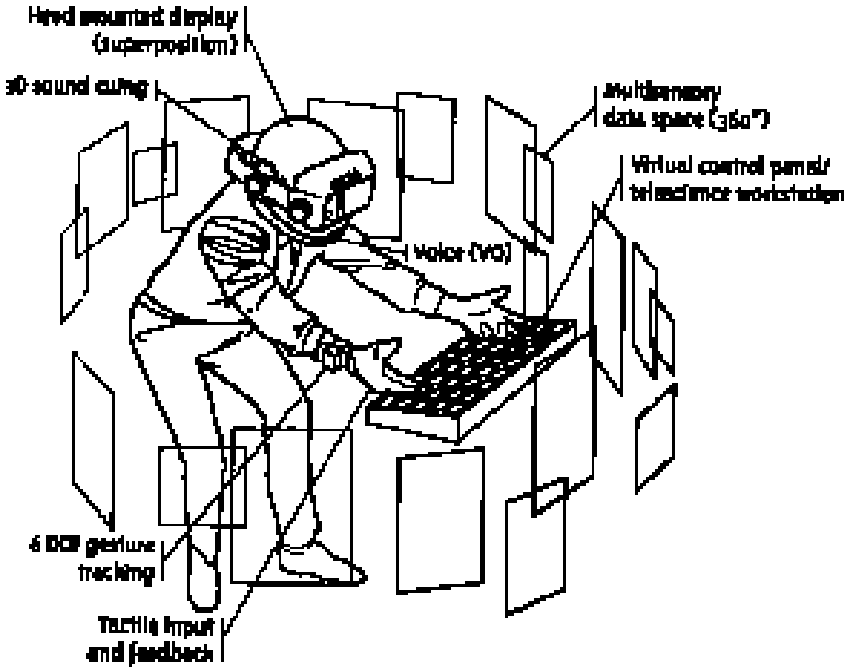
video

NASA Ames Research Center

- **Mike McGreevy and Scott Fisher developed the first affordable VE system in the mid 1980's.**
- **Their system consisted of a head-mounted display (their own design but contracted out to Leep Optics) and a VPL DataGlove (they contracted with VPL to build this under NASA's specifications).**

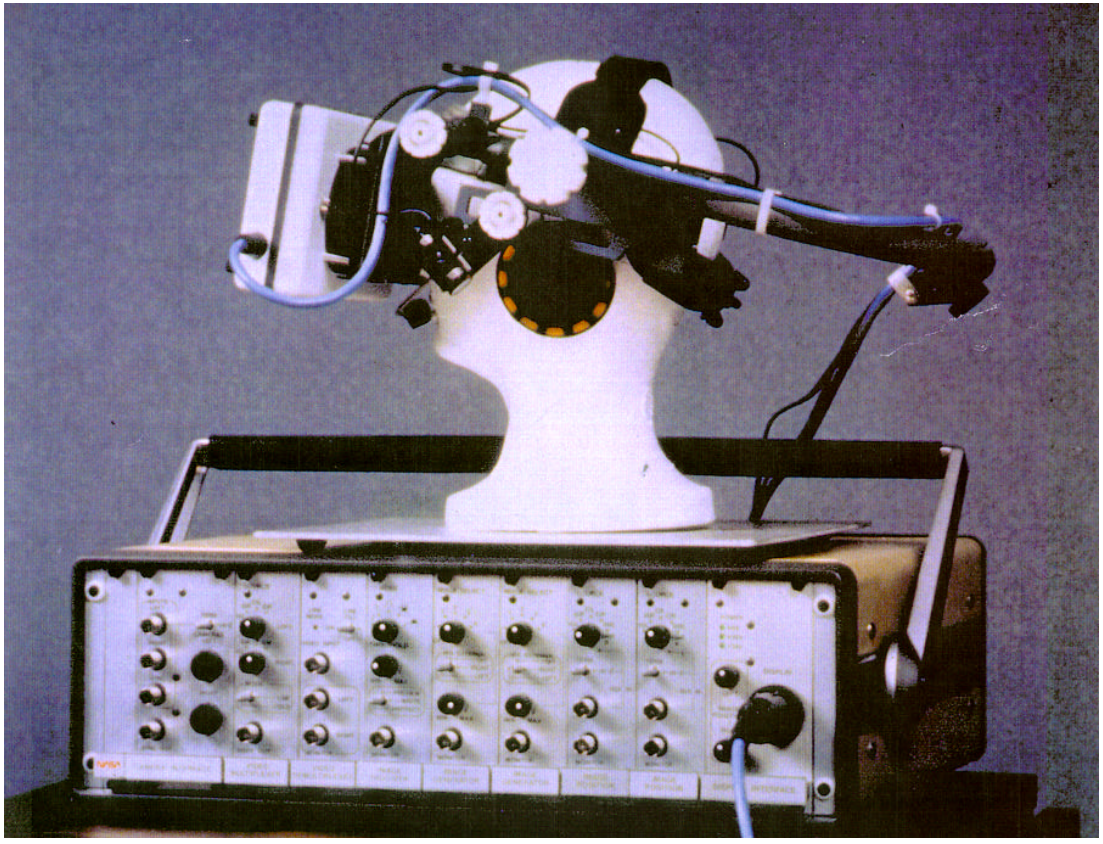
video

NASA's VIEW Project

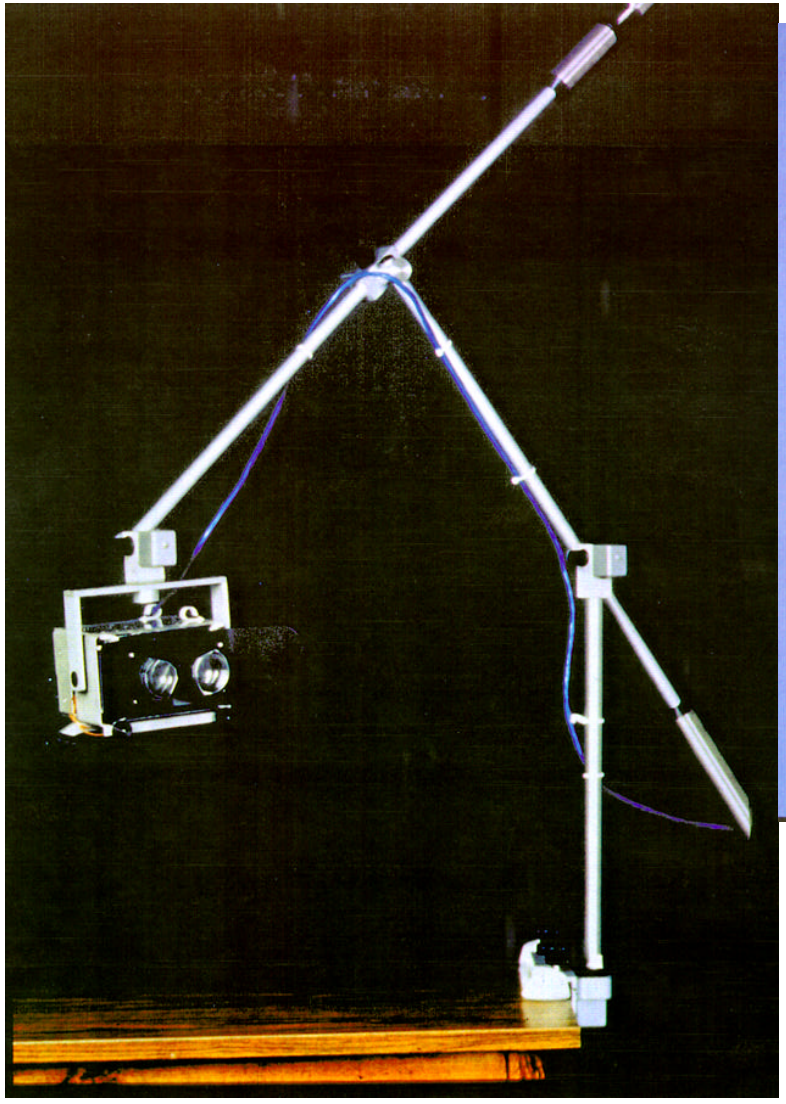


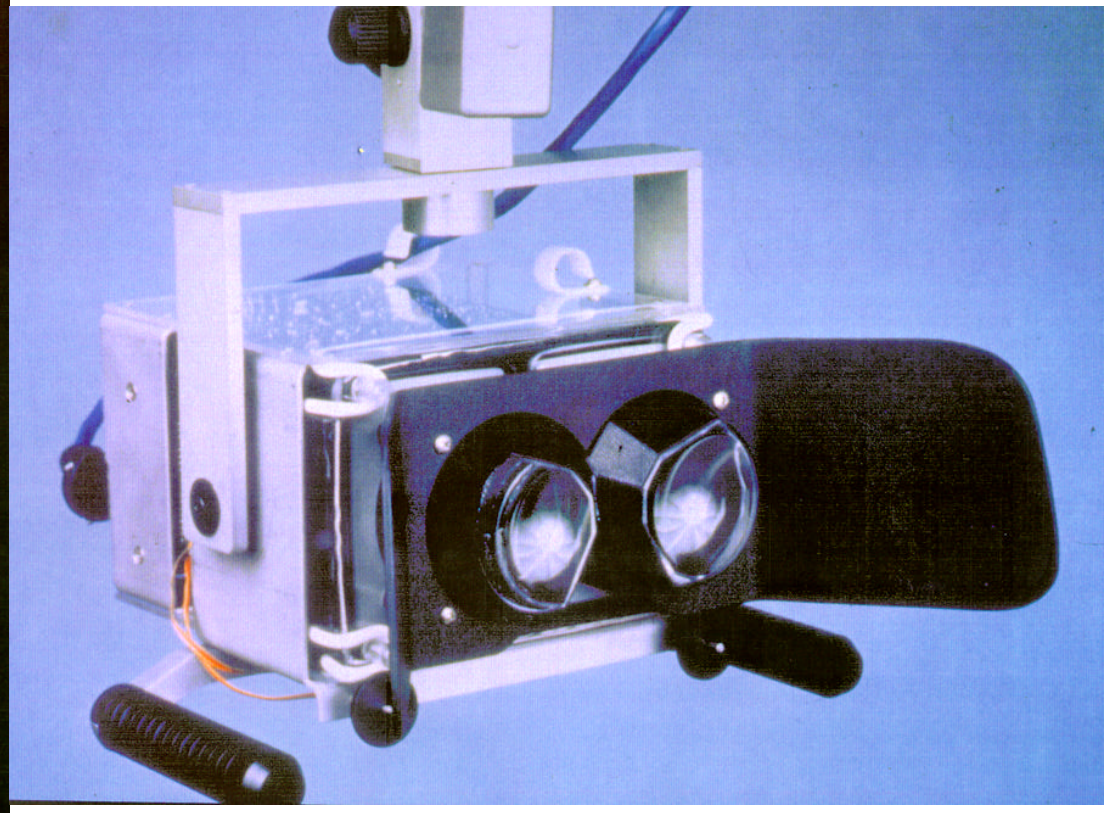
NASA's Early HMD

NASA's HMD

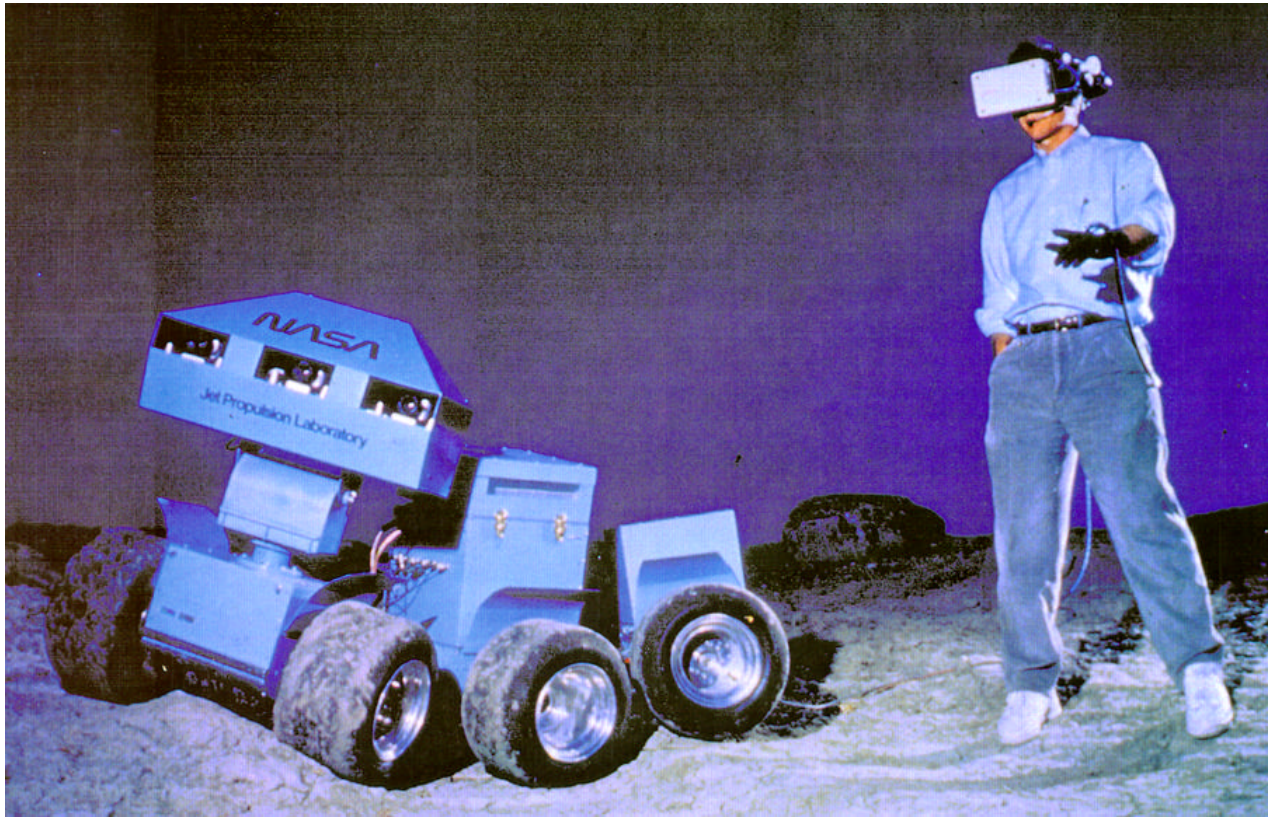


NASA's BOOM Mounted Display



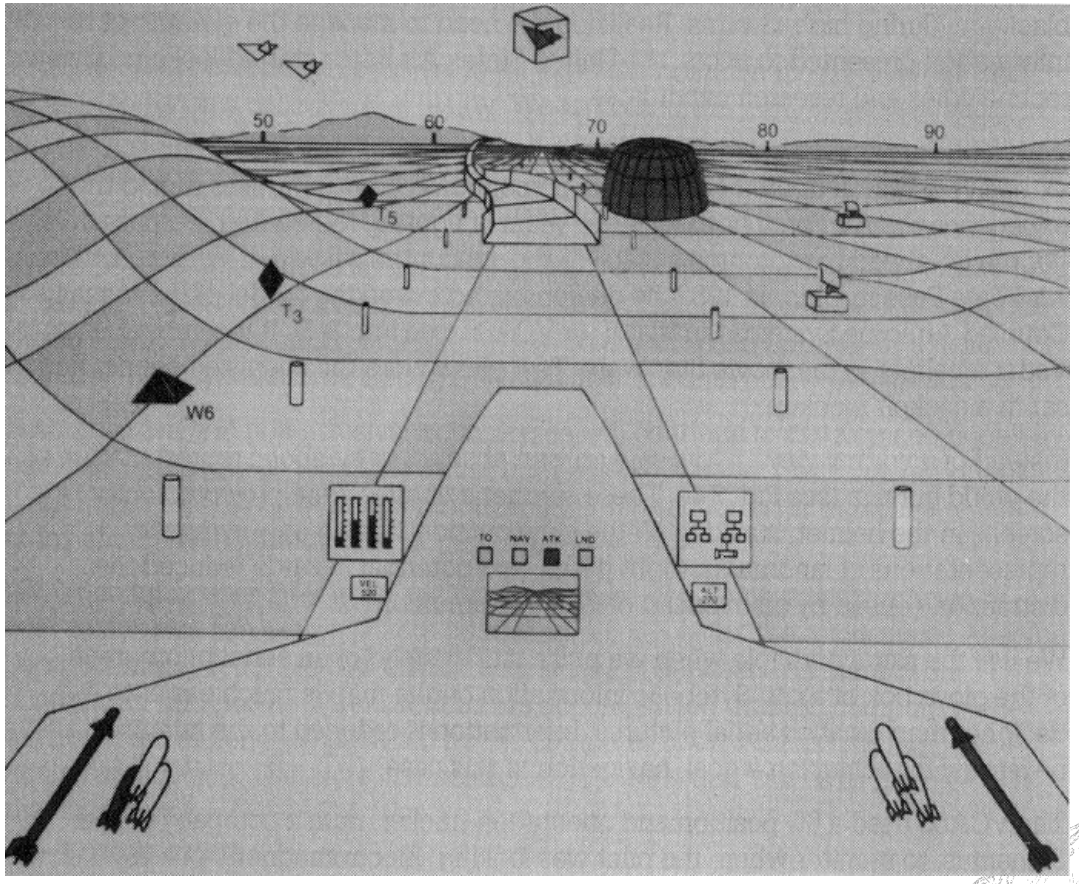


NASA Telerobotics

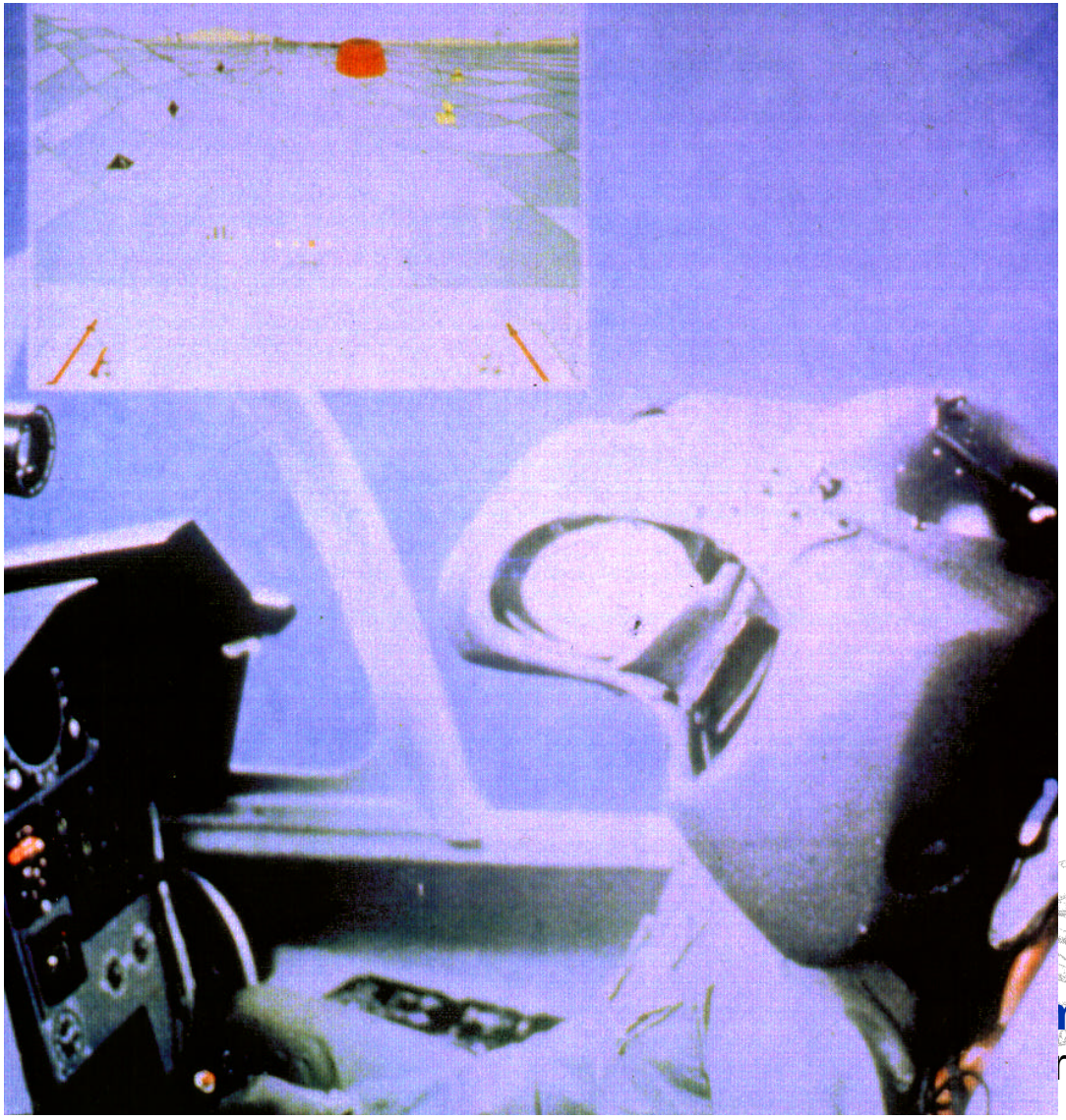


USAF Wright Patterson Armstrong Lab

The “Super Cockpit”

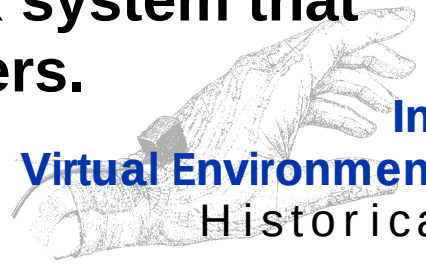


Supercockpit Displays



VPL Research

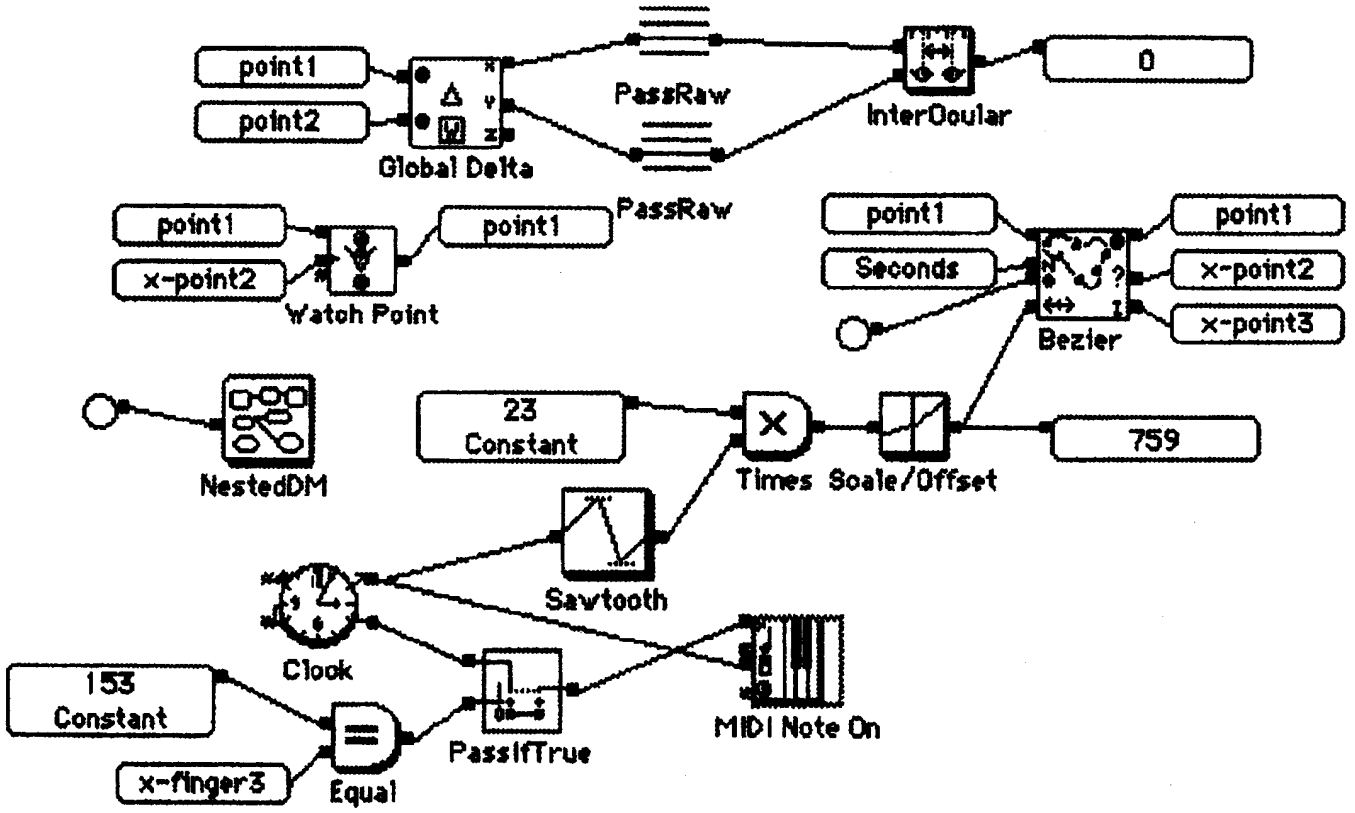
- **VPL produced the first commercial VR hardware and system (RB2).**
- **VPL developed the DataGlove and PowerGlove and eventually a tactile feedback glove.**
- **They commercialized the NASA HMD technology - based on LCD displays and a special optics system.**
- **Produced software for the design of virtual environments.**
- **Produced a commercial VR system that can support one or two users.**



VPL's Reality Built for Two (RB2)

- **A development platform for designing and implementing real-time virtual realities.**
  - Development was rapid & interactive using a visual programming language.
    - Behavior constraints and interactions were edited in real-time.
- **Changes made to the interactions in the world were seen immediately.**
  - For example, attach gravity to an object and see it fall.
- **RB2 consisted of 3 software modules and a variety of hardware.**
  - The design & control workstation was a Mac II running a solid modeling application called RB2 Swivel and a data flow/real-time animation control package called Body Electric.

VPL's Body Electric



VPL Devices

Dataglove

Eyephones

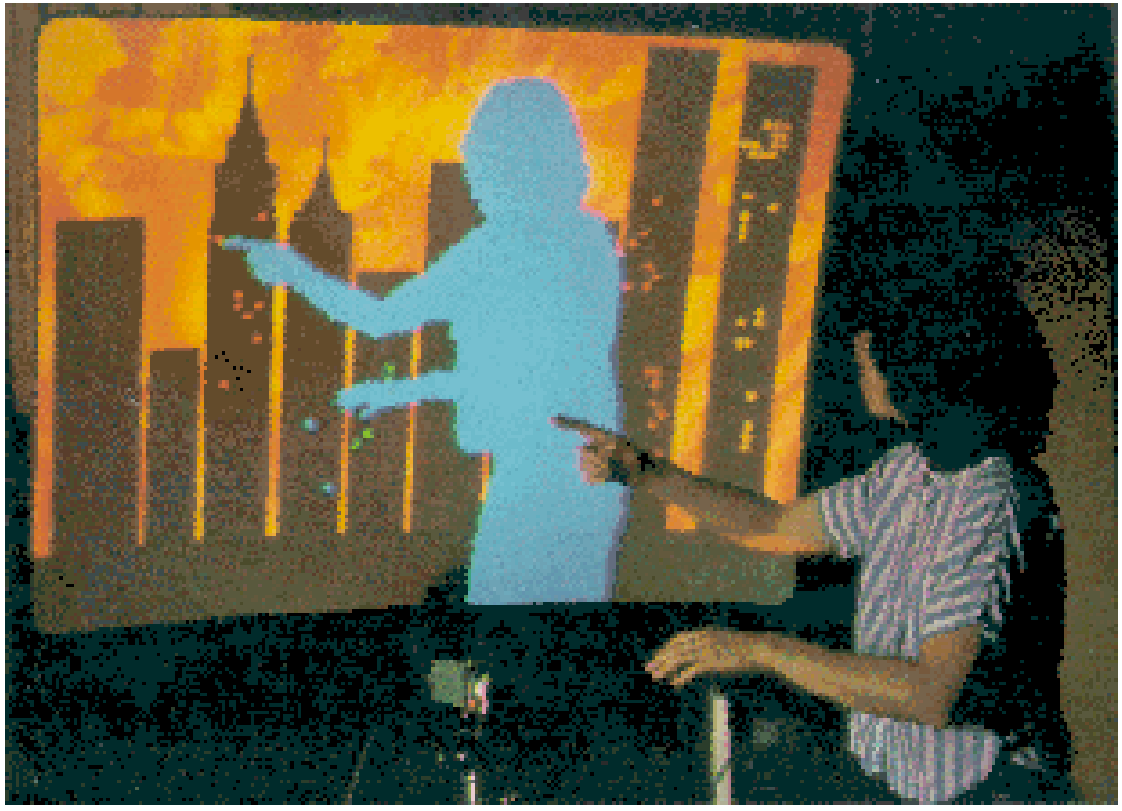
Artificial Reality Corporation

- **Myron Krueger, one of the early pioneers of VE technology.**
- **Most of his work is video, rather than geometric graphics.**
- **He also focuses on systems that do not require the participant to wear anything.**
- **Early work:**
  - GLOWFLOW
  - METAPLAY
  - PSYCHIC SPACE
  - VIDEOPLACE

Videoplace

video

Mandala System



Other Important Early People & Places...

- **University of Washington, Seattle**
  - HITL
  - VEOS
  - Retinal scanner
- **Naval Postgraduate School**
  - NPSNET
- **University of Illinois at Chicago**
  - CAVE
- **Sense8**
  - WorldToolKit
  - WorldUp
- **Homebrew VR**
  - Powerglove
  - Rend386
- **Coryphaeus Software**
  - Designer's workbench
  - Easy Terrain
  - EasyScene
- **MultiGen, Inc.**
  - MultiGen II
  - SmartScene
- **Division, Inc.**
  - dVISE
- **Fakespace, Inc.**
  - BOOM displays
  - Pinch gloves